# TESTIMONY ON FEDERAL FUNDING AND THE RESEARCH UNIVERSITY

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### Introduction

Mr. Chairman and members of the Committee, I am pleased to be here today and to have this opportunity to speak on behalf of a research university and the relationship of federal funding to the human-, knowledge- and economic-capital that these institutions continually produce.

Amongst the spectrum of higher educational institutions in the United States, the top 100 research universities provide an advanced educational experience for over 2 million undergraduate and 280,000 graduate students in a distinct learning environment that has been formed by the strong relationship between the federal government and the research universities over the past 50 years. These institutions produce 75% of the nation's Ph.Ds (and hence most of the faculty of all the universities and colleges), their graduates are a national wealth in human capital that includes our teachers, engineers, scientists, architects, lawyers, business leaders, physicians, and so many other groups of people on whom we depend. These institutions conduct half of the basic research that is done in the United States—every year pushing out the boundaries of knowledge. The ideas and inventions of that research have led to a substantial return on the investment in terms of new products—and the associated new companies, new jobs—that have led to such improvements in our quality of life.

## Virginia Commonwealth University—and federal funding for its research

Virginia Commonwealth University is a public university that includes one of the nation's oldest schools of medicine and the nation's newest accredited school of engineering. In federal obligations for science and engineering R&D, we rank 88th and second in Virginia. This year we will receive approximately $160M in competitive externally funded awards for our research and training, of which 64% will be from the federal government, and 12% each from state, foundation and industry sources. So, like our peer institutions, it is our relationship with the federal government that makes us a research university. These funds will support almost 1000 research projects. While we are one of the largest academic health systems in the United States, and the largest part of our federal funding is from the NIH, the impact of what we are able to do would be severely limited without the integration with advanced capabilities in our other disciplines. For example, the work we do in tissue regeneration in our school of medicine depends on the work done in our school of engineering in advanced polymers that has led to nanoscale, biocompatible tissue support scaffolds. Work funded in one field by the NIH has now merged with work funded in another by the Department of Defense and the NSF to become more valuable. VCU is the largest employer in Richmond and one third of all Virginia indigent care is provided in our hospital. But the ideas and inventions of research add substantially to its economic impact. In the example given here, the research has led to a promising Richmond-based start-up company. Last year VCU was involved in the start-up of seven companies. As a result of our research, VCU together with its Biotech Research Park has had an extraordinary role in the renewal of inner city Richmond.

VCU is typical of public research institutions in that there are few means of supporting creative research other than the efforts of faculty who write proposals to funding agencies and are successfully awarded grants or contracts to fund their work. The research enterprise in such a university must essentially stand on its own financial base. Approximately one dollar out of every five coming into the university is in the form of a grant or contract. These external research funds are woven through most of what we do. This funding establishes the caliber of the education we offer. This year Virginia Commonwealth University will receive about $100M in federal funding for research. This includes about $20M in facilities and administration costs to cover the shared support of the grants management, accounting, human subjects protection, research animal care, handling of hazardous materials, and research facilities. With the scope and cost of compliance expanding continually and the rate at which technology becomes outdated, it is vital that the grants cover the cost of the university's research support structure that must meet a broad front of regulation.

The largest portion of the $100M in federal funding that we will receive this year is spent on salaries for the people who work in the research enterprise: the salaries of our research faculty for the time that they spend on research vs. teaching or clinical responsibilities; the stipends for the graduate students who serve apprenticeships in the research programs; the salaries of post-doctoral fellows—many of whom will become principal researchers and

teachers themselves; and the salaries of the technicians, data and computer specialists, and assistants all of whom make up the research engine of the university. The federal funding provides the resources that allow us to build a base of leading faculty and allow us to compete for strong graduate students. The caliber of these individuals then sets the character and tone of much of the university—most of which is the undergraduate enterprise. Our undergraduates would not have the learning experience they now have if we did not have the ability to attract and retain such faculty as a result of this $100M in federal research funds. And, of course, these funds buy the advanced equipment and supplies that are essential to research. This means that employers hiring our students know that they have been exposed to state-of-the-art environments and approaches to problem-solving and dealing with complex issues. Their experience has not been limited to textbooks and problems with known answers.

The University invests a portion of the recovered shared costs in maintaining our competitive edge: an important part of these funds goes into the so-called start-up recruitment packages for new faculty—the funds to get them and their research teams competitively launched. We use a portion of the indirect costs to reward productive departments and groups with additional funding for graduate student assistantships and to mentor new faculty as they begin a research career. As a result of these bootstrapping efforts, VCU grew in federal funding by 17% last year and will increase its federal funding this year by 20%.

This enhancement is what enriches our educational value and the quality of the engineers, physicians, educators and social scientists that we graduate. This growth in our research capabilities and expertise is the magnet that attracts sponsors from the private sector. Companies would not have an interest in partnering with us if we did not have the leading edge researchers and facilities that are made possible by our research grants from the NSF, NIH and DoD.

The growth and the need to stay ever state-of-the-art in facilities and equipment poses great challenges for the institution. We have an increasingly urgent need for modern laboratory and research space. This means adding new space and renovating facilities constructed in the 1960’s and the 1970’s. The NIH has a program that supports the construction or reconstruction of research facilities. This has enormous value for universities like ours. I am able to use part of the indirect costs recovered to provide 1:1 matching funds for a grant from NIH that will allow us to completely renovate 10,000 square feet of outdated space into an advanced laboratory to study the pathways by which cells develop diseases such as diabetes and cancer. The promise of the new facility is allowing us to recruit three strong researchers in this area and we will soon have a nationally leading group that has critical mass enough to make an impact. Our students will learn from these faculty and experience these facilities. An NSF program to assist institutions renovate their outdated chemistry and physics and math facilities would be of great value to VCU and would influence the decisions of students to select science and mathematics programs.

VCU is the international leader in comprehensive emergency-room-to-return-to-workplace

traumatic brain injury care. This strength includes neuroscientists, neurosurgeons, neuropharmacologists, psychiatrists, psychologists, and rehabilitation specialists and spans five of the schools within the university. Last year represented our 27th year of continuous federal funding in this field and saw over $14M in competitive federal funding for our research involving the brain. The efforts of our researchers have resulted in the survival rate of traumatic brain injury being improved by 30%, over 1200 papers in the literature, and one-third of all the clinical trials of new drugs for brain injury treatment have been designed and executed from our hospitals and clinics. If you suffer traumatic brain injury in Washington DC or in our forces in Afghanistan, you will be managed in accordance with principles developed and researched at VCU as a result of the critical mass of expertise that has been built and the leading edge it has been given with federal basic research support. Three years from now we hope to inhabit our new Brain Research Institute that will allow us to co-house for the first time, 30 of these international leaders and their research teams around shared core facilities. The State of Virginia will provide funds for the construction of the building itself, but only with partnership with the federal government can we acquire the advanced facilities and retain and enhance the research teams who will change the outcomes of traumatic brain injury. The annual cost of treatment for traumatic brain injury in the United States is estimated to be about $35B. VCU's research will lead to a reduction in this figure.

However, our ability to deliver on the full promise of our commitment to the life sciences is inherently limited if we cannot integrate the ideas and expertise of our creative chemists in the production of nanosignaling particles to assist molecular imaging; our physicists to work with the shaping of particle beams for cancer therapies; our chemical engineers to develop the bio-chips for diagnosis and therapy; our mechanical and electrical engineers to work in the development of advanced limb replacement and robotic assists; and our mathematicians to work in image interpretation. To contribute at the required level, all of these must have achieved a level of excellence in their fields that comes from competitive research funding primarily from the National Science Foundation and the Department of Defense. The development of our integrated strength and impact is tied to NSF and DoD basic research funding.

The federal government will not make a better investment this year than the $24B it will invest to support basic research and the research infrastructure of our research universities. The footprint of that investment is national, extensive in time, and has major international dimensions.

## Conclusion

Mr. Chairman, I want to thank you and the Committee for giving me this opportunity to tell you about the pivotal role of federal research funding in shaping the nature of our research universities—one of our most vital national assets.